

**A NEW PTILONEURID GENUS (PSOCOPTERA: PTILONEURIDAE)
FROM DOMINICA**

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Abstract.—*Willreevesia dominica*, new genus, new species, is described from the island of Dominica, Lesser Antilles. It has a combination of complete labral sclerites, all distal labral sensilla but the central one trichoid, distinct anterior extensions of V2+3, complex phallosome, with triangular external parameres and mesal three pronged structure and hind wing M simple, which makes it unique in the family. A cladistic analysis indicates that it is the sister taxon to a clade consisting of *Ptiloneuropsis* Roesler, *Ptiloneura* Enderlein, and *Loneura* Navas.

Key Words: Ptiloneuridae, *Willreevesia*, new genus, Dominica, Lesser Antilles

The Neotropical epipsocete family Ptiloneuridae presently includes the genera *Euplocania* Enderlein (Brazil, Nicaragua, Paraguay, Perú), *Triplocania* Roesler (Belize, Bolivia, Brazil, Colombia, Costa Rica, Guatemala, México, Panamá, Perú), *Ptiloneura* Enderlein (Perú), *Ptiloneuropsis* Roesler (Brazil), *Loneura* Navas (Argentina, Bolivia, Brazil, Costa Rica, Guatemala, México, Nicaragua, Perú, U.S.A., Venezuela) and *Perucania* New & Thornton (Perú). All the species so far documented in the family are continental. Here I describe a new genus in the family, from specimens recently collected on the island of Dominica (Lesser Antilles).

The specimens for microscopic study were dissected in 80% alcohol, and their parts (head, wings, legs, and genitals), were mounted on slides in Canada balsam. Color was recorded by observation of whole specimens illuminated with cold, white light at 50×. Measurements of parts on the slides (given in microns), were taken with a filar micrometer whose measuring unit is 1.36

microns for wings and 0.53 microns for other parts. Abbreviations are as follows: FW = forewing; HW = hind wing; F = femur; T = tibia; t1, t2, t3 = hind leg tarsomeres; ctt1 = number of ctenidia on t1 of hind leg; Mx4 = fourth segment of maxillary palp; fl . . . fn = flagellomeres fl . . . fn; IO = minimum distance between compound eyes; D = antero-posterior diameter of compound eye; d = transverse diameter of compound eye; PO = d/D. The holotypes and most paratypes are deposited in the National Insect Collection (CNIN), Departamento de Zoología, Instituto de Biología, Universidad Nacional Autónoma de México, México City. One paratype of each sex will be deposited in the Department of Entomology, Soils and Plant Sciences, Clemson University, Clemson, South Carolina, U.S.A.

***Willreevesia* García Aldrete, new genus**

Diagnostic features.—Belonging in the Ptiloneuridae (sensu Lienhard and Smithers 2002). Labral sclerites complete, slender,

tenuous, curved outwards at each end, not as well defined as in Epipsocidae, *Cladiopsocus* or Neurostigmatidae. Five distal labral sensilla, a central large placoid, and two smaller trichoid on each side. Forewing M five or six branched, branch next areola postica distally forked. Hindwing M simple. V1 long, slender; V2+3 with a distinct distal process. Hypandrium simple. Phallosome with lateral struts stout, V-shaped, external parameres triangular and a mesal, strongly sclerotized, three pronged structure.

Type species.—*Willreevesia dominica*, new species.

***Willreevesia dominica* García Aldrete,
new species
(Figs. 1–11)**

Female.—*Color*: Ground color creamy white, with reddish-brown areas as indicated below. Compound eyes black, ocelli hyaline, with ochraceous centripetal crescents. Head pattern same as illustrated for male (Fig. 2). A dark brown, large, almost rectangular area on each gena, between compound eye and mandible. Maxillary palp creamy white. Antenna brown, flagellomeres with apices white. Thorax with irregular ochraceous areas on each pleuron. Tergal lobes of meso- and metathorax reddish brown. Legs pale brown. Femora with proximal, median and distal brown spots. Wings almost hyaline, slightly washed with a brown hue; veins brown, each with a small brown macula distally. Forewing pterostigma with a proximal and a distal brown band; brown areas on distal ends of Cu2 and 1A, and between Cu1A and wing margin. Abdomen with distinct, transverse, ochre subcuticular bands.

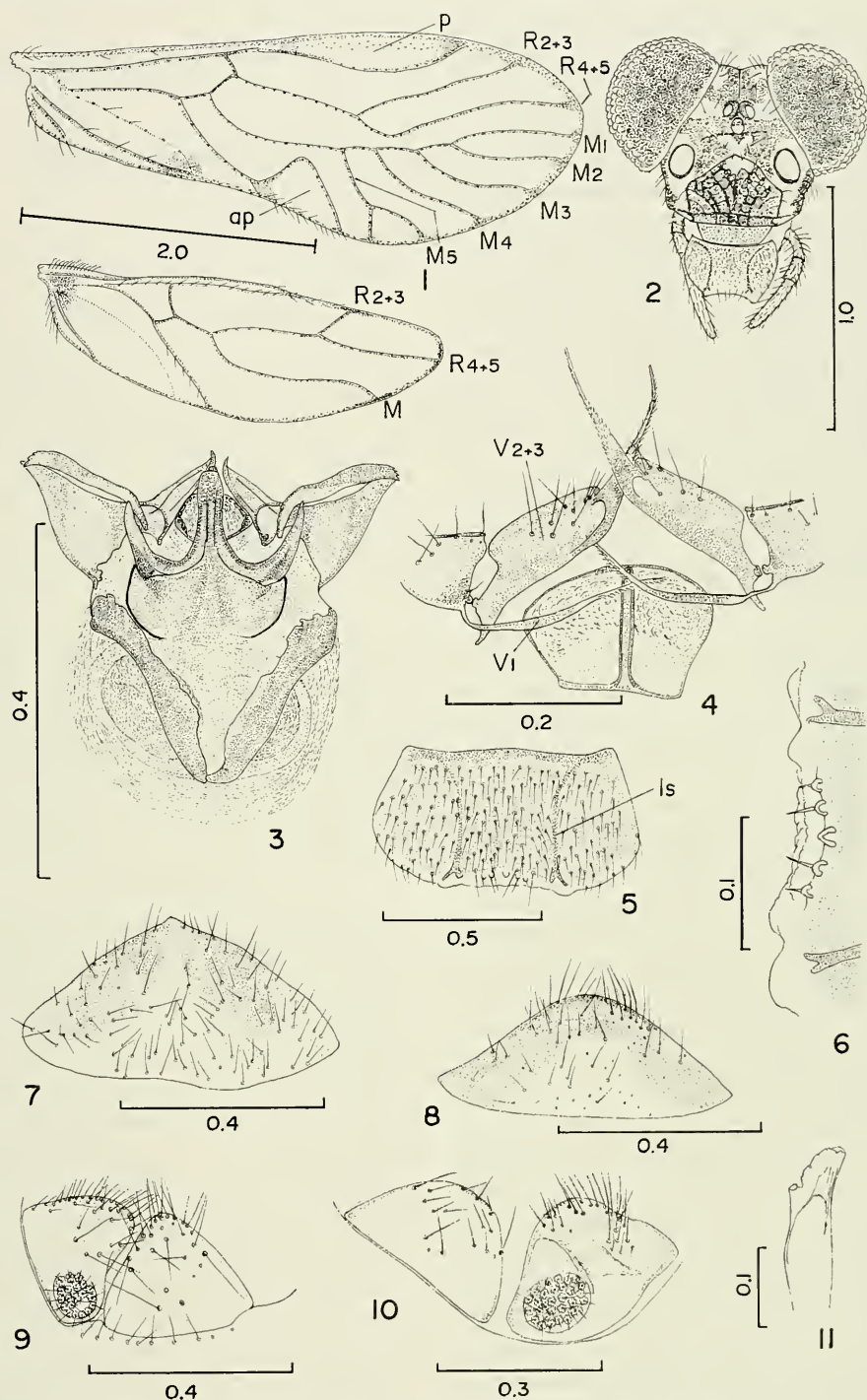
Morphology: Lacinial apex with outer cusp large, with 6–8 denticles (Fig. 11). Labral sclerites complete, slender, outwardly curved at each end (Fig. 5). Five distal labral sensilla; one large central placoid, with two smaller trichoid ones on each side (Fig. 6). Forewing (same as illustrated for the male, Fig. 1), M with 5–6 branches, branch

next to areola postica distally forked. Areola postica wide, high, with apex rounded. Pterostigma elongate, proximally narrow, wider in middle. Hindwing (same as illustrated for male, Fig. 1), with M simple. Subgenital plate approximately triangular, broad, setose, with a well-defined pigmented area on each side (Fig. 7). Gonapophyses (Fig. 4): first valvulae (V1) long, slender, with a field of short spines distally on outer edge; V2+3 robust, extended anteriorly as illustrated, with a distinct, long distal process, armed distally with numerous microspines; third valvulae (V3) a bulge on side of second valvulae (V2), with 6–8 macrosetae. Ninth sternum distinct, with a strongly sclerotized band longitudinally, dividing sclerite in two symmetric halves (Fig. 4). Paraprocts robust, with setae as illustrated; sensory fields elliptical, with 22–23 trichobothria issuing from basal rosettes (Fig. 9). Epiproct broad, triangular, with a group of three mesal macrosetae near anterior border, other setae on distal half, as illustrated (Fig. 9).

Measurements: FW: 4209, HW: 2918, F: 1224, T: 1864, t1: 871, t2: 80, t3: 145, ctt1: 28, Mx4: 295, f1: 885, f2: 565, IO: 383, D: 408, d: 281, IO/D: 0.94, PO: 0.69.

Male.—*Color*: Same as female.

Morphology: Head (Fig. 2), with large, bulging compound eyes. Hypandrium simple, broad, setose, pigmented area as illustrated (Fig. 8). Phallosome complex, with lateral struts robust, V-shaped; external parameres triangular, each internally associated with a stout, acuminate prong, and with an elongate, slender sclerite posteriorly, distally denticulate. Mesally in area between external parameres, a broad based, distinct sclerotized structure, posteriorly with a central, stout, distally rounded column, with a slender baculum underneath, and extended to form on each side an acuminate prong; above this three-pronged structure, posteriorly, a strongly sclerotized disk (Fig. 3). Paraprocts broad, robust, setose; sensory fields elliptical, with 30–32 trichobothria issuing from basal rosettes (Fig. 10). Epiproct



Figs. 1-11. *Willreevesia dominica*. 1. Fore- and hind wings. ♂. 2. Front view of head. ♂. 3. Phallosome. ♂. 4. Gonapophyses and ninth sternum. ♀. 5. Labrum. ♀. 6. Distal labral sensilla. ♀. 7. Subgenital plate. ♀. 8. Hypandrium. ♀. 9. Right paraproct and epiproct. ♂. 10. Epiproct and left paraproct. ♀. 11. Distal end of lacinia. ♂. Abbreviations: p, pterostigma; ap, areola postica; V1, first valvula; V2+3, valvula 2+3; ls, labral sclerite. Scales in mm.

Table 1. Characters utilized for the phylogenetic analysis of Ptiloneuridae.

1. FW M: 3 branched (0), 4 branched (1), 5–8 branched (2).
2. HW M: Unbranched (0), 3–5 branched (1).
3. FW pterostigma with a spur-vein (0), or without a spur-vein (1).
4. FW areola postica high, rigidly triangular (0), or high, with apex rounded (1), or low, extremely long (2).
5. FW areola postica free (0), or joined to M by a crossvein (1).
6. FW 2 A more than half the length of 1 A (0), or less than half the length of 1 A (1).
7. Labral sclerites complete, curved outward (0), or incomplete, straight (1).
8. Male hypandrium a single sclerite, without posterior projections (0), or a central sclerite, with posterior projections, flanked by small sclerites (1).
9. Phallosome complex, with symmetric phallic sclerites and lateral struts V shaped (0), or simple, without phallic sclerites and lateral struts straight (1).
10. Phallosome with a transverse, three pronged sclerotized structure in area between external parameres (0), or with paired sclerites in same area (1), or without sclerites (2).
11. External parameres broadly triangular, distally pointed (0), or elongate, distally rounded (1).
12. Epiproct of males and females with a group of three mesal macrosetae near anterior border (0), or without mesal macrosetae near anterior border (1).
13. Male paraprocts with mesal prongs (0), or without mesal prongs (1).
14. Female ninth sternum with large, distinct spermapore (0), or with spermapore inconspicuous (1).
15. Apices of female paraprocts and epiproct with stout setae (0), or without stout setae (1).

trapezoidal, with a group of three mesal macrosetae near anterior border, three setae along posterior edge, in a field of microspines, and other setae on posterior third, as illustrated (Fig. 10).

Measurements: FW: 4390, HW: 3050, F: 1259, T: 2061, t1: 954, t2: 90, t3: 152, ctt1: 31, Mx4: 310, f1: 1064, f2: 662, IO: 214, D: 576, d: 395, IO/D: 0.37, PO: 0.68.

Types.—Holotype ♂, Dominica. Parish of St. Joseph, Springfield State, 15–20.III.2003. Malaise trap in humid forest, 430 m (15°22.8'N: 61°20.5'W). M. E. Irwin, M. B. Shepard, E. Benson, G. Carner. Same data as holotype, 2 ♂♂, 1 ♀ paratypes. Parish of St. Mark, 4 km N Soufriere, 17–19.III.2003, Malaise trap in dry wash of deciduous forest, 70 m (15°14.3'N: 61°22'W), same collectors, allotype ♀; 7 ♂♂, 6 ♀♀ paratypes. 1 km W Pt. Guignard, 17–19.III.2003, Malaise trap in dry wash of deciduous forest (15°14.6'N: 61°22.3'W), same collectors, 1 ♀ paratype.

Etymology.—The genus name honors Dr. Will Reeves of Clemson University, South Carolina, for making available for study a collection of Psocoptera from Dominica, which included the specimens here described, and in recognition of his work on

Diptera and on cavernicolous organisms. The specific name refers to the island of Dominica to which this taxon is endemic. The genus name is feminine; the species name is a noun in apposition.

THE POSITION OF *WILLREEVESIA* IN PTILONEURIDAE

To assess the phylogenetic relationships of the ptiloneurid genera, including *Willreevesia*, a matrix of 15 characters was assembled (Tables 1–2). *Spurostigma* Eertmoed and *Cladiopsocus* Roesler were also included and treated as outgroups, both belong in the family Cladiopsocidae and considered close to the Ptiloneuridae (Yoshizawa 2002), although that author did not recognize Cladiopsocidae as a monophyletic taxon. The matrix was edited utilizing WinClada 0.9.99 (Nixon 1999) and ran in Nona 2.1 (Goloboff 1997). All characters were unordered and had the same weight. 1,000 replicas were run in groups of 250 sequences of random addition (Kitching 1995, Lipscomb 1998), and retaining 20 trees in each replica (non ambiguous optimization, heuristic search with the following parameters: h = 10,000; mult* = 250;

Table 2. Matrix of characters for the phylogenetic analysis of Ptiloneuridae. *Spurostigma* and *Cladiopsocus* are outgroups.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Euplocania</i>	1	0	1	1	0	1	1	1	0	0.1	1	0	1	1	0
<i>Triplocantia</i>	0	0	1	1	0	1	1	1	0	0.1	1	0	1	1	0
<i>Ptiloneura</i>	2	1	1	1	0	1	1	1	0	1	1	0	1	2	2
<i>Ptiloneuropsis</i>	2	1	1	0	1	1	1	0	0	0	1	0	1	2	2
<i>Loneura</i>	2	1	1	1	0	1	1	1	0	0.1	1	0	1	1	1
<i>Perucania</i>	0	0	1	2	0	1	1	1	0	0	1	0	1	1	1
<i>Willreevesia</i>	2	0	1	1	0	1	0	0	0	0	0	0	1	1	1
<i>Spurostigma</i>	0	0	0	1	0	0	1	0	1	2	1	1	1	0	1
<i>Cladiopsocus</i>	0	0	1	1	0	1	0	0	1	2	1	1	0	0	1

h/ = 20; the analysis was repeated ten times with the same parameters).

A single tree was found, with L = 20 steps, a Consistency Index of 0.90 and a Retention Index of 0.85 (Fig. 12). The cladogram indicates that Ptiloneuridae is monophyletic, supported by characters 9:0, 10:0, 12:0, and 14:1. Two distinct clades are recognized: one, including *Perucania*, *Euplocania*, and *Triplocania*, supported by character 8:1, and the other, including *Willreevesia*, *Ptiloneuropsis*, *Ptiloneura*, and *Loneura*, supported by character 1:2. *Willreevesia* is the sister group to the assemblage *Ptiloneuropsis*-*Ptiloneura*-*Loneura*, differing from them in having the labral sclerites complete (7:0) and the external parameres of the male phallosome distinctly triangular (11:0), and by having the HW M simple (2:0). It shares with *Ptiloneuropsis* a simple hypandrium, without posterior projections (8:0).

DISCUSSION

Willreevesia presents a combination of characters that makes it unique in the family: It is the only ptiloneurid with complete labral sclerites and with triangular male external parameres; also, it is the only one in which the outermost distal labral sensilla are trichoid and in which the anterior extension of the gonapophyses are distinctly different from those in the other genera. Also unique is the combination of wing venation characters: branches of FW M as in *Ptiloneuropsis*-*Ptiloneura*-*Loneura*, combined with HW M as in the members of the other clade (*Perucania*-*Euplocania*-*Triplocania*). Other than *Willreevesia*, all the other ptiloneurids are continental. Since *Ptiloneuropsis* and *Ptiloneura* are quite restricted geographically (only known from Itatiaia National Park, Rio de Janeiro, Brazil and from Callanga and Vilcanota Songo, Chaco, Perú, respectively), it is likely that *Willreevesia* is an offshoot of *Loneura*, the species of which occur from Arizona, USA, to northern Argentina, in an episode of is-

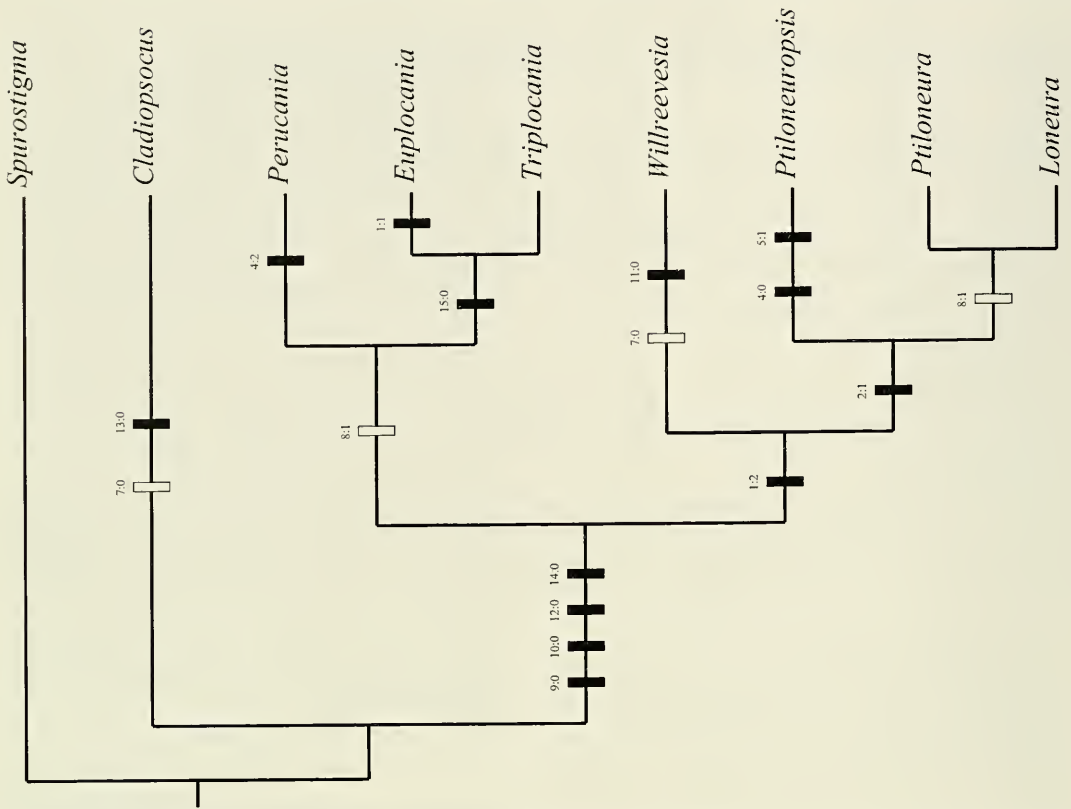


Fig. 12. Phylogeny of the genera of Ptiloneuridae, generated by Nona. L = 20, CI = 0.90, RI = 0.85. *Spurostigma* and *Cladiopsocus* are outgroups

land colonization followed by evolution in isolation.

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